

CLAIMS

1. A display comprising:

a display device having an image output surface at which an image is displayed as a spaced array of pixel elements;

5 an image guide coupled to the image output surface of the display device and comprising a plurality of light transmission guides each having an input end and an output end, the input ends of the light transmission guides being arranged relative to one another so that groups of one or more light transmission guides receive light from respective groups of one or more pixel elements;

10 in which, for a cluster comprising at least a subset of the light transmission guides:

15 at the outer periphery of the cluster, the input ends of the light transmission guides are surrounded by an inner frame having optical properties substantially similar to the optical properties of the light transmission guides and having an input surface arranged to receive light from the image output surface of the display device, and an outer frame having thermal expansion properties substantially similar to the thermal expansion properties of the light transmission guides,

20 the inner frame being optically coupled to each light transmission guide adjacent thereto and comprising a reflective layer covering at least the surfaces of the inner frame opposite to the input surface of the inner frame and the surfaces of the inner frame adjacent to the outer frame, light entering the inner frame and impinging on the reflective layer being reflected to exit the inner frame via the portion of the inner frame optically coupled to adjacent light transmission guides or via the input face of the inner frame.

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2. A display according to claim 1, wherein the inner frame comprises a plurality of light transmission guides, the reflective coating covering substantially all surfaces of each light transmission guide in the inner frame other than the portion of each light transmission guide in the inner frame optically coupled to adjacent light transmission guides, and the input face of each light transmission guide in the inner frame.

3. A display according to claim 2, wherein the plurality of light transmission guides in the inner frame are formed into a plurality of adjacent rows along each side of the inner frame, each row being optically coupled to an adjacent row.
- 5 4. A display according to claim 2 or claim 3, wherein the light transmission guides in the inner frame are truncated at their output end.
5. A display according to claim 1, wherein the inner frame comprises a continuous boundary of material.
- 10 6. A display according to any one of claims 1 to 5, wherein the reflective layer is a deposited metal layer.
- 15 7. A display according to any one of claims 1 to 5, wherein the reflective layer is a metallic adhesive tape.
8. A display comprising:
a display device having an image output surface at which an image is displayed as a spaced array of pixel elements;
- 20 a light transmitting element having a viewing surface, the light transmitting element arranged to receive light from the display device and display the received light on the viewing surface;
the light transmitting element having a polarising layer arranged in an optical path between the display device and the viewing surface;
- 25 wherein the polarising layer is arranged to attenuate unpolarised ambient light received from outside the display while substantially transmitting polarised light received from the display device.
9. The display of claim 8, wherein the polarising layer is optically coupled to a
30 face of the light transmitting element.

10. The display of claim 9, wherein the polarising layer is optically coupled to the face of the light transmitting element adjacent the display device.
11. The display of claims 8, 9 or 10, wherein the light transmitting element is a
5 transparent sheet.
12. The display of claim 11, wherein the transparent sheet is a glass sheet or a plastic sheet.
- 10 13. The display of claim 12, wherein the transparent sheet is a touch panel or a loudspeaker device.
14. The display of claims 8 to 13, further comprising an antireflective layer coupled to the face of the light transmitting element at the image output surface of the
15 display.
15. The display of claim 14, further comprising an antireflective layer coupled onto the polarising layer of the light transmitting element.
- 20 16. The display of any one of claims 8 to 15, wherein the light transmitting element is an image guide comprising a plurality of light transmission guides each having an input end and an output end, the input ends of the light transmission guides being arranged to receive light from respective groups of one or more of the pixel elements.
- 25 17. The display of claim 16, further comprising a polarising layer coupled to the display device and aligned to the polarising layer of the light transmitting element.
18. The display of claims 16 or 17, further comprising a phase modulator coupled to the polarising layer of the light transmitting element.
- 30 19. The display of claim 16 to 18, further comprising a phase modulator coupled to the display device.

20. A backlit display comprising:
 - a backlight having light emitting regions and non-emitting regions;
 - a modulator, arranged to receive light emitted from the backlight;
- 5 light redirecting means, arranged to redirect a portion of the light emitted from the light emitting regions of the backlight onto areas of the modulator in closest relationship to the non-emitting regions of the backlight.
21. A display according to claim 20, wherein the backlight comprises:
 - 10 one or more fluorescent lamps, each lamp comprising a continuous light emitting region, at least one end of the continuous light emitting region terminating in a non-light emitting region.
22. A display according to claims 20 or 21, wherein the light redirecting means
15 comprises one or more reflecting elements.
23. A display according to claims 20 to 22, wherein the light redirecting means comprises one or more refracting elements.
- 20 24. A display according to claim 20 to 23, wherein the light redirecting means is located between the light emitting regions of the backlight and the modulator.
- 25 25. A display according to any one of claims 20 to 22, wherein the light redirecting means is located outside of the light emitting regions of the backlight.
26. A display according to claim 25, wherein the reflecting elements are arranged in a louvered structure to allow airflow between the backlight and the modulator through louvered apertures in the reflecting elements.
- 30 27. A display according to any of claims 20 to 26, wherein the light redirecting means comprises a plurality of separate strips of material.

28. A display according to any of claims 20 to 26, wherein the light redirecting means comprises a plurality of strips deposited onto, or moulded into, a sheet of optically transparent material.
- 5 29. A display comprising:
- a display panel having an image output surface at which an image is displayed as a spaced array of pixel elements;
 - an image guide comprising a plurality of light transmission guides each having an input end and an output end, the input ends of the light transmission guides being arranged to receive light from respective groups of one or more pixel elements, and a base frame surrounding the input ends of the light transmission guides;
 - a first frame having an aperture, the first frame being rigidly attached to the base frame, the display panel being positioned against the image guide within the aperture of the first frame;
- 15 a second frame having a smaller aperture than the first frame, the second frame overlapping the display panel and applying pressure to the display panel thereby retaining the display panel in close proximity to the image guide, the second frame being elastically coupled to the first frame.
- 20 30. A display according to claim 29, wherein the base frame and the first frame are formed together as a single frame.
31. A display according to claim 29 or claim 30, wherein the second frame is less rigid in a direction perpendicular to the plane of the display panel than both of the 25 display panel and the first frame, the second frame being distorted in the direction perpendicular to the plane of the display panel, the distortion resulting in a force being applied by the second frame against the display panel in the direction of the image guide.
- 30 32. A display according to any one of claims 29 to 31, wherein the input face of the image guide protrudes from the face of the base frame.

33. A display according to any one of claims 29 to 32, wherein the first frame and the second frame are coupled together via an intermediate layer.
34. A display according to claim 33, wherein the intermediate layer flexibly couples the second frame to the display screen.
35. A display according to any one of claims 29 to 34, wherein the first frame comprises a plurality of separate elements.
- 10 36. A display according to any one of claims 29 to 35, wherein the second frame comprises a plurality of separate elements.
37. A display according to claim 36, wherein the second frame overlaps the first frame such that the separate elements of the first frame and second frame are coupled together as a single unit.
- 15 38. A display according to any of claims 29 to 37, wherein one or more of the base frame, the first frame and the second frame inhibit light leakage around the edge of the display panel into the image guide.
- 20 39. A display according to any of claims 29 to 38, wherein the second frame comprises a light reflecting or diffusing surface on the side facing the backlight, light impinging on the light rereflecting or diffusing surface being redirected towards the backlight
- 25 40. A display comprising:
a plurality of image guides, each image guide comprising a plurality of light transmission guides having an input and an output end, and a base frame having a coefficient of thermal expansion substantially matching that of the light transmission guides, the base frame surrounding the input ends of the light transmission guides;
means for coupling the plurality of image guides into an array in which the output surfaces of the image guides form a continuous surface;

a supporting frame, the supporting frame having greater rigidity than the base frames, and a different coefficient of thermal expansion to the base frames, the base frames being coupled to the supporting frame by a connecting means allowing relative movement between the base frames and the supporting frame in a plane substantially parallel to the output surfaces of the image guides.

5 41. The display of claim 40, wherein the image guides are directly coupled together.

10 42. The display of claim 40 or claim 41, wherein the supporting frame comprises struts, the base frames being coupled to the struts.

43. The display of claim 42, wherein the struts are positioned in the cavity formed between adjacent image guides and their respective base frames.

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44. The display of claim 42, wherein the struts are at least partially recessed into the base frames.

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45. The display of any of claims 40 to 44, wherein the frictional properties of the surfaces of the base frames and any other structures within the display for which there may be differential movement under conditions of thermal expansion are such that the lateral forces which may result from differential expansion with the display are smaller than the force required to distort the base frames.

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46. A display comprising:

a display device having an image output surface at which an image is displayed as a spaced array of pixel elements;

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an image guide coupled to the image output surface of the display device and comprising a plurality of light transmission guides each having an input end and an output end, the input ends of the light transmission guides being arranged relative to one another so that groups of one or more light transmission guides receive light from respective groups of one or more pixel elements;

in which electrically conductive material is provided between and along at least a portion of the length of at least a subset of the light transmission guides, the electrically conductive material being arranged to absorb electromagnetic radiation emitted from the display device, the electrically conductive material between light transmission guides in separate regions of the image guide being electrically connected together.

47. The display of claim 46, wherein the electrically conductive material comprises carbon-loaded plastic strips.

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48. The display of claim 46 or claim 47, wherein the electrically conductive material comprises wire.

49. The display of claim 48, wherein the wire is formed as a wire mesh.

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50. The display of any of claims 46 to 49, further comprising a conductive shield surrounding the non-screen area of the display, wherein the electrically conductive material is electrically connected to the electrically conductive shield.

20 51. A tiled display, comprising:

a plurality of display panels formed into a plurality of rows and arranged to form a single image output surface, each display operable to display a plurality of lines of pixels;

25 display control means, arranged to refresh each display panel on a line by line basis in accordance with a refresh pattern;

in which the refresh pattern for pairs of vertically adjacent display panels are such that a lower region of an upper display panel of the pair is refreshed at substantially the same time as an upper region of a lower display panel of the pair.

30 52. A display according to claim 51, wherein adjacent rows of display panels alternate between, for a first row of display panels, being refreshed on a sequential line by line basis from the top line to the bottom line of each display in the row and, for a

second row of display panels, being refreshed on a sequential line by line basis from the bottom line to the top line of each display in the row.

53. A display according to claim 52, wherein the display panels in alternate rows are rotated by 180 degrees with respect to an adjacent row of display panels in the plane of the image output surface, the rotated display panels being provided with an inverted image.

10 54. A display according to claim 52, wherein successive rows of display panels alternate between using a top to bottom pixel addressing scheme and a bottom to top pixel addressing scheme.

55. A backlit display comprising:

15 a transmissive display device having an image output surface at which an image is displayed as a spaced array of pixel elements;
the spectral loss of the display device in the visible spectrum being greatest toward the blue end of the visible spectrum; and

20 a backlight providing illumination of the display device;
in which the emission of light from the backlight in the visible spectrum predominates at the blue end of the visible spectrum.

56. The display of claim 55, comprising a light transmitting element having a viewing surface, the light transmitting element arranged to receive light from the display device and display the received light on the viewing surface.

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57. The display of claim 56, wherein the light transmitting element is an image guide coupled to the image output surface of the display device and comprising a plurality of light transmission guides each having an input end and an output end, the input ends of the light transmission guides being arranged relative to one another so that groups of one or more light transmission guides receive light from respective groups of one or more pixel elements.

58. The display of claims 55, 56 or 57, wherein the backlight comprises one or more phosphor lamps.